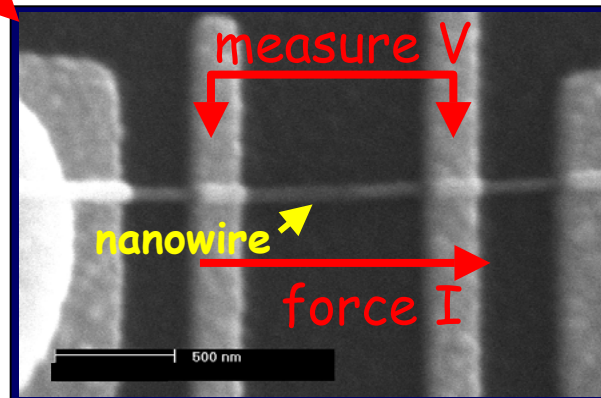
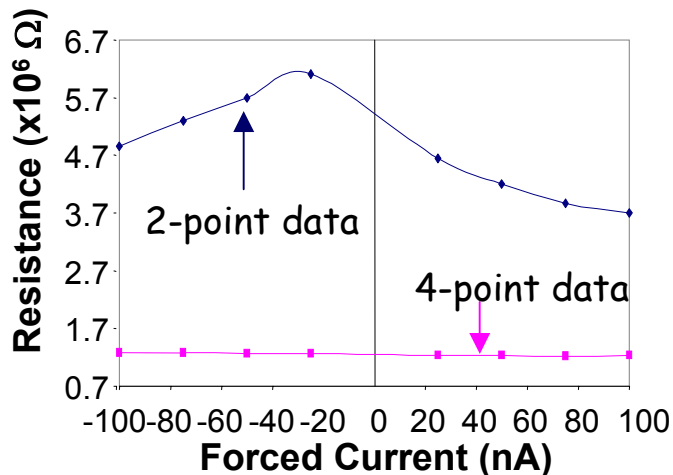
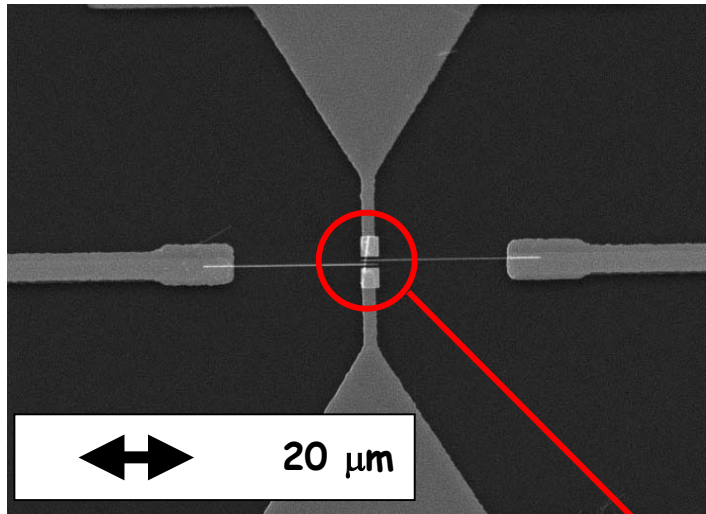


# Semiconductor Nanowires: Building Blocks for Nanoscale Electronics

Joan Redwing, Theresa Mayer, Suzanne Mohny and Ari Mizel  
Penn State University, DMR-0103068

Semiconductor nanowires, functioning as interconnects and device elements, may represent the future of high density electronics, sensors and displays. Our research is focused on understanding the impact of size and structure on electrical transport in nanowires.

Fabrication methods have been developed to produce silicon and silicon-germanium nanowires and control their diameter and conductivity through intentional doping. Field assembly is used to align and position the nanowires onto pre-patterned platforms for electrical testing. A four-point contact technique (shown here) was developed to accurately measure nanowire resistivity which varied from  $0.25 \Omega\text{-cm}$  to  $3.8 \Omega\text{-cm}$  in p-type silicon nanowires, consistent with a measured decrease in boron concentration in the structures.



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## Education and Outreach:

This project contributed to the training and development of seven graduate students who are pursuing advanced degrees in materials science and engineering, electrical engineering and physics. Four undergraduates and a high school chemistry instructor (Todd McPherson-State College Area High School) also participated in the research during the summer as part of NSF-sponsored "Research Experiences for Undergraduate" and "Research Experiences for Teachers" programs at Penn State.



REU Student  
Sarah Dilts  
monitoring  
chemical vapor  
deposition system

RET Teacher  
Todd  
McPherson  
using scanning  
electron  
microscope

